

REMARKS

Favorable reconsideration of this application is respectfully requested in light of the following remarks, wherein Claims 3 and 4 have been amended. Claims 1-10 are currently pending in the present application.

Claims 1-10 stand rejected under 35 USC § 103(a) as being unpatentable over WO 01/69041 to *Hakkinen* in view of *Lehtinen et al.* ("Mobile Robots Evolving in Industrial Applications").

The present invention, as defined in independent Claim 1, pertains to a method and system of monitoring the location of a mining vehicle in a mine. The method comprises driving at least one mining vehicle during one work cycle at least in a first work area and in a second work area of the mine; determining data on the location of the mining vehicle in the mine; transferring said location data to a mine control system; employing, in location data transfer, a data communication connection communicating with the mine control system; employing the obtained location data in the mine control system for monitoring the operation of the mining vehicle, determining the location of the mining vehicle substantially continuously on the basis of a dead reckoning, wherein the distance travelled is calculated and the travel direction is determined; identifying, when operating in the first work area, at least one identifier whose location is accurately known; determining the location data of the mining vehicle on the basis of the identification data; and updating the location data determined in the dead reckoning on the basis of the location data of the identifier when driving in the first work area.

Independent Claim 8 defines a system for monitoring the location of a mining vehicle in a mine, the system comprising a first work area and a second work area in the mine, in which areas the mining vehicle is arranged to drive during one work cycle; at least one

measuring device for determining the distance travelled by the mining vehicle, and further at least one measuring device for determining the direction of the mining vehicle; a mine control system; at least one control unit arranged in the mining vehicle; at least one data transfer connection for data transfer between the control unit of the mining vehicle and the mine control system; and in which system location data of the mining vehicle are arranged to be transferred via the data transfer connection from the mining vehicle to the mine control system, the location of the mining vehicle is arranged to be determined substantially continuously on the basis of a dead reckoning by taking into account the distance travelled and the direction; at least one identifier whose location is known to the control unit is arranged in the first work area; the mining vehicle is arranged to identify the identifier when driving in the vicinity of the identifier; the control unit is arranged to determine location data on the basis of the identification data; and the control unit is arranged to update the location determined in the dead reckoning on the basis of the location data of the identifier.

According to independent Claims 1 and 8, the mine comprises at least a first work area and a second work area. Only when the mine vehicle is driven in the first work area, the location data determined in the dead reckoning is updated. The second work area may be, for example, a production tunnel wherein the conditions are rough. As such, it is very difficult to arrange any identifiers for updating purposes therein. In contrast, in the first work area, the conditions are better. As such, the first work area is provided with identifiers, the exact locations of which are known. None of the art of record disclose these patentable features.

In contrast, *Hakkinen* discloses the use of two separate vehicles- a measuring vehicle and a mining vehicle. The measuring vehicle includes measuring means for measuring a mine, and a marking device for providing the measured mine with positioning marks. The mining vehicle does not include any measuring devices. *Hakkinen* discloses to first measure

and mark the mine with a separate measuring vehicle, and only thereafter, the mining vehicle can be driven accurately in the mine.

As further described in *Hakkinen*, the mine vehicle is driven in the mine remote-controlled by an operator, as described on page 5, lines 5-7. Thereby, the marks made by the measuring device are used to position the mining vehicle into an exact position, as described on page 5, line 17. Although the mine vehicle of *Hakkinen* can be arranged to be driven automatically, it still must follow mark sequences on the wall. In accordance with this scenario, the mine vehicle still does not include any measuring devices. In fact, it is an object of *Hakkinen* to avoid measuring devices, such as inertia navigation devices and the like to be used in a mine vehicle, as described on page 2, lines 21-23 and page 3, lines 13-17.

Nevertheless, the Examiner alleges that it would have been obvious to one of ordinary skill in the art at the time of the invention to replace the inertial measurement device 11 of *Hakkinen* with the dead reckoning device of *Lehtinen et al.* to determine and update the position, distance and direction of a mining vehicle. However, Applicants respectfully submit that this combination is not appropriate.

First, the mine vehicle in *Hakkinen* does not include any inertial measurement device. As described above, *Hakkinen* seeks to eliminate the use of any measurement devices, and uses a separate measuring vehicle to accomplish this task. Accordingly, one having ordinary skill in the art would not look to add the dead reckoning to the mine vehicle of *Hakkinen*, because it would make the mine vehicle more complex and expensive. The object of *Hakkinen* is to keep the mine vehicle as simple as possible and to remote control it in a mine under the control of an operator.

Lehtinen et al. discloses a system that regularly update sexact absolute pose after traveling a certain distance, as described on page 98, left column, at the beginning of the 3rd paragraph, and as shown in Fig. 4. Thus, *Lehtinen et al.* teaches to update the position

estimation at all places in the mine, which is something the present invention seeks to avoid. Accordingly, neither reference, in combination or alone, discloses the patentable features of independent Claims 1 and 8.

For at least the foregoing reasons, it is submitted that the method and system of independent Claims 1 and 8, and the claims depending therefrom, are patentably distinguishable over the applied documents. Accordingly, withdrawal of the rejections of record and allowance of this application are earnestly solicited.

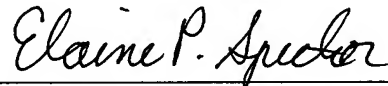
Should any questions arise in connection with this application, or should the Examiner believe a telephone conference would be helpful in resolving any remaining issues pertaining to this application, it is respectfully requested that the undersigned be contacted at the number indicated below.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§ 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account 50-0573. This paragraph is intended to be a CONSTRUCTIVE PETITION FOR EXTENSION OF TIME in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully Submitted,

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